Space Weather Forecast

Issued on Sunday, 05 March 2023 at 01:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate class flares (R1-R2; Minor-Moderate radio blackouts) likely. Chance of Minor Geomagnetic Storm intervals.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with three Moderate class flares observed. At 04/1557UTC the most significant flare occurred from the largest and most complex sunspot region in the Sun's far northwest. This particular region has now rotated across the limb. A significant Coronal Mass Ejection (CME) was observed. There are eight numbered sunspot regions on the current Sun. Most of the regions on the Sun comprised small magnetically unipolar regions. At present there are thought to be no significant Earth-directed CMEs, however this is discussed further below.

Solar Wind / Geomagnetic Activity: The solar wind was characteristic of an elevated to fast solar wind, and has remained close to 600 km/s throughout. The number of particles in the solar wind was below average. The associated magnetic field was weak as was the all-important north-south component. The net effect of the above solar wind measures was for sub-Minor Geomagnetic Storm activity throughout, with Quiet to Active levels observed.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Though the large sunspot in the northeast responsible for much of the activity in recent days is now rotating over the limb the flare risk remains relatively elevated, particularly as new regions are expected to rotate into view in the coming days. Moderate solar activity is expected with further Moderate class flares likely and a slight but reducing chance of isolated X-class flares giving High levels of solar activity.

Solar Wind / Geomagnetic Activity: No significant Earth-directed CMEs (coronal mass ejections) feature in the current forecast, however there is a possible glancing blow from the fast CME associated with a Strong flare from 3 March, which could arrive early on Day 2 (6th). A further CME from 4 March may also give a glancing blow on Day 4 (8th). The current geomagnetic forecast is dominated by the HSS related to CH81- which is forecast to begin to wane later into Day 2 (6th) or more likely from Day 3 (7th). A chance of G1 Minor Geomagnetic Storms throughout, with the risk probably highest on Day 2 and 4 (6th and 8th) associated with the possible arrival of the aforementioned CMEs glancing blows.

Energetic Particles / Solar Radiation: Although Solar Radiation levels remain at background levels, recent Strong flare activity implies there remains a slight chance of protons increasing in the immediate term, reverting to the raw risk for the disc at nearer 10% into the new working week.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	30	20	30
Strong	G3	No	1	5	1	5
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	55	50	50
Very Active	R3 to R5 X	Yes	20	15	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	15	10	10
Very Active	≥ S3 *	No	5	5	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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